

T R A N S L A T I O N

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RADIAL IMPELLER

Application No.: 56-146246 (1981)

Application Date: September 18, 1981

Inventors: Torami KANEKO, et. al.

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1. Title of Invention:

RADIAL IMPELLER

2. Claim:

A radial impeller that is made into an impeller by a blade and a shroud and that provides a communication hole to lead a portion of the water flow which has been pressure raised by the impeller into the impeller inlet.

3. Detailed Discription of Invention:

This invention concerns an impeller for a centrifugal pump. It especially concerns a radial impeller suitable to prevent the generation of cavitations.

The prior art radial impeller is explained by a centrifugal pump shown in Figures 1 and 2. A radial impeller (1) consists of front shroud (1a), a blade (1b) and a rear shroud (1c) and is affixed to a rotating axis (2). A diffuser (3) is provided at the outlet side of the impeller (1); a flow passage (5) facing the next following impeller (not illustrated) is formed through a flushing blade (4). Fixed walls (6) and (7) are provided near the wall surface of the front shroud (1a) and rear shroud (1c) of the impeller (1). Spaces (8) and (9) and narrow spaces (10) and (11) are respectively formed between the fixed wall (6) and the front shroud (1a), and the rear shroud (1c) and the fixed wall (7).

Because of the above mentioned structure, a portion of the flowing water exhausted from the impeller (1) leaks out to the

inlet side of the impeller (1) by passing through the space (8) and the narrow space (10). A portion of the flowing water flows from the inlet side of the next following impeller into the space (9) through the narrow space (11). Therefore, if the pump's inlet pressure is low, cavitations (12) are generated near the front rim of the blade (1b). If it is driven in this condition for a long time, corrosion is generated over the surface of the blade surface that is located near the breaking of the cavitations. Thus, original pump performance cannot be maintained.

The objective of this invention is to offer a radial impeller with a very simple structure that prevents the generation of cavitations and also prevents corrosion by cavitations.

It is well known that cavitations are generated when the hydrostatic pressure near the impeller inlet drops near a saturation steam pressure that corresponds to the temperature of flowing water. Therefore, the generation of cavitations can be prevented by increasing the hydrostatic pressure near the impeller inlet. In this invention, a communication hole is provided in an impeller shroud, and a portion of the flowing water that has been pressure raised by an impeller is led to the impeller inlet through this communication hole. The hydrostatic pressure of the impeller inlet is then raised and the generation of cavitations is prevented.

An example of this invention is explained below with the

accompanying Figures 3 through 7. The same sections shown in Figures 1 and 2 are used. As a result, explanations of these sections are omitted. Figures 3 and 4 show a first example of this invention. A communication hole (13) is provided inside of the front shroud (1a) and directly leads through the space (8) and the impeller inlet. Therefore, even though the pump inlet pressure is low, a portion of the flowing water that has been pressure raised by the impeller is lead to the impeller inlet from the space (8) and the hydrostatic pressure of the impeller inlet of impeller is raised. As a result, no cavitations are generated, and there is also no corrosion caused by cavitations. Consequently, original pump performance can be maintained.

Figure 5 shows a second example of this invention. A communication hole (14) that faces the blade (1b) is provided inside of the front shroud (1a), and the narrow space (10) and the inlet section of blade are conductive. By means of this construction, the same effect as in the First Example can be obtained, but any water flow problems from the communication hole (14) can be reduced.

Figure 6 is a third example of this invention. A communication hole (15) is provided inside of the rear shroud (1c), and the space (9) and the impeller inlet are conductive. Figure 7 is a fourth example of this invention. A communication hole (16) is provided inside of the rear shroud (1c), and a flow passage (5) and the inlet of impeller are conductive. With this

structure, almost the same effect as in Example 1 can be obtained.

In accordance with this invention, the hydrostatic pressure of the impeller inlet can be raised even though the pump inlet pressure becomes low. Therefore, cavitations do not generate and there is no corrosion by cavitations.

4. Simple Explanation of Figures:

Figure 1 is side cross-sectional view of a centrifugal pump equipped with a prior art radial impeller. Figure 2 is front view of the impeller showing cavitations generated on Figure 1's centrifugal impeller. Figure 3 is a side cross-sectional view of the centrifugal pump equipped with the first example of this invention's of radial impeller. Figures 4 is a front view of Figure 3's impeller. Figures 5, 6 and 7 are side cross-sectional views of a centrifugal pump equipped with radial impellers of the second, third and fourth examples of this invention, respectively.

1a... front shroud

1b... blade

1c ... rear shroud

8,9... space

10, 11... narrow space

13, 14, 15,16... communication hole

Figure 1:

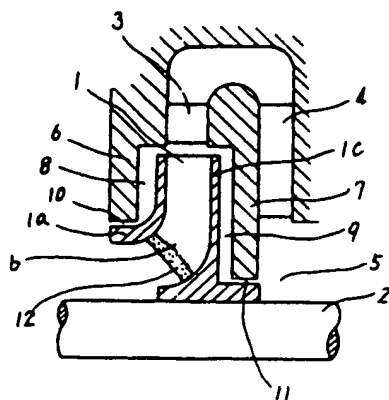


Figure 2:

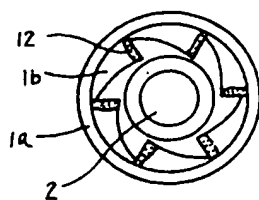


Figure 3:

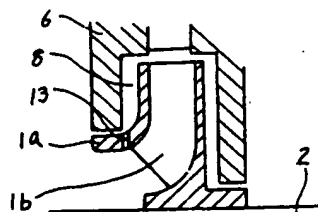


Figure 4:

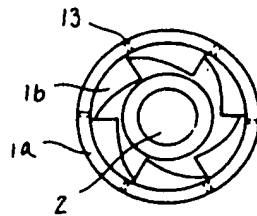


Figure 5:

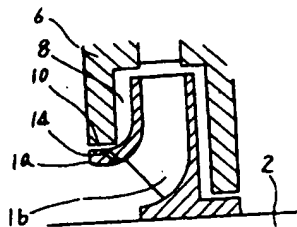


Figure 6:

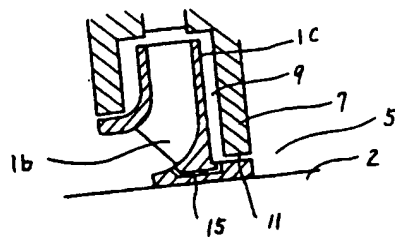
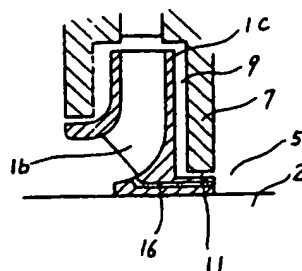


Figure 7:



Patent Applicant: Hitachi Seisaku-sho KK

(54) CENTRIFUGAL IMPELLER

(11) 58-48796 (A) (43) 22.2.1983 (19) JP

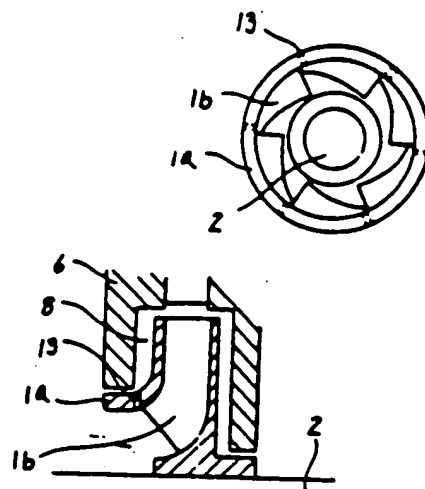
(21) Appl. No. 56-146246 (22) 18.9.1981

(71) HITACHI SEISAKUSHO K.K. (72) HIROMI KANEKO(2)

(51) Int. Cl. F04D29/22, F04D29/66

PURPOSE: To prevent generation of cavitation by a method wherein a communicating hole is provided in the shroud of the impeller and a part of flowing water increased in the pressure thereof by the impeller is introduced into the inlet of the impeller through said communicating hole to increase the static pressure of the inlet port of the impeller.

CONSTITUTION: A communicating hole 13 is provided in a front shroud 1a and a gap 8 between a fixed wall 6 and the front shroud 1a is communicated directly with the inlet port of the impeller. Therefore, the static pressure of the inlet port of the impeller may be increased by introducing a part of the flowing water, increased in its pressure by the impeller, from the gap 8 into the inlet port of the impeller even when the suction pressure of the pump is reduced. According to this method, the cavitation will never be generated, and therefore, corrosion due to the cavitation may be prevented.



⑬ 日本国特許庁 (JP)

⑭ 特許出願公開

⑫ 公開特許公報 (A)

昭58-48796

⑮ Int. Cl.³
F 04 D 29/22
29/66

識別記号

庁内整理番号
7532-3H
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⑯ 公開 昭和58年(1983)3月22日

発明の数 1
審査請求 未請求

(全 3 頁)

① 通心羽根車

② 特 願 昭56-146246
③ 出 願 昭56(1981)9月18日
④ 発 明 者 金子廣美
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⑤ 発 明 者 真淵正弘
土浦市神立町502番地株式会社

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土浦市神立町502番地株式会社
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番1号
⑧ 代 理 人 弁理士 薄田利幸

明 細 書

1. 発明の名称 通心羽根車

2. 特許請求の範囲

羽根とシムラウドにより羽根車を構成する通心羽根車において、前記羽根車によつて昇圧された流体の一部を前記羽根車入口に導くための通孔を前記シムラウド内に設けたことを特徴とする通心羽根車。

3. 発明の詳細な説明

本発明は通心ポンプ用羽根車に係り、特にキャビテーションの発生を防ぐために好適な通心羽根車に関する。

従来の通心羽根車を第1図、第2図に示す通心ポンプにより説明する。通心羽根車1は前部シムラウド1a、羽根1b、背面シムラウド1cによりなり、図1に示すように、羽根車1の出口側にはダイヤフューズ3が設けられ、流体1を介して次段の羽根車(図示せず)に向かう通路が形成されている。羽根車1の前部シムラウド1a、背面シムラウド1cの壁面に沿って図

1に示すように、羽根車1の出口側にはダイヤフューズ3が設けられ、流体1を介して次段の羽根車(図示せず)に向かう通路が形成されている。羽根車1の前部シムラウド1a、背面シムラウド1cの壁面に沿って図

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炭水の流量に対応する飽和蒸気圧力付近に低下すると発生することが知られている。従つて、羽根車入口付近の静圧を高めることによりキャビテーションの発生を防ぐことができる。本発明では、羽根車シュラウド内に通過孔を設け、この通過孔を通して羽根車によつて昇圧された炭水の一部を羽根車入口に導いて羽根車入口の静圧を上昇させキャビテーションの発生を防ぐとするものである。

以下、本発明の実施例を図3図〜図7図について説明する。第1図、第2図と同一部分には同一符号を付して説明を省略する。第3図、第4図は本発明の第1実施例を示し、前面シュラウド1a内に通過孔13を設け、図8と羽根車入口部とを直接導通している。このため、ポンプの吸込圧が低くなくても、羽根車によつて昇圧された炭水の一部を図8から羽根車入口に導いて羽根車入口の静圧を上昇させるので、キャビテーションは発生せずキャビテーションによる腐食も発生しない。従つて当初のポンプ性能が維持される。

第1図は従来の通心羽根車を具備する通心ポンプの側断面図、第2図は第1図の通心羽根車に生ずるキャビテーションを示す羽根車正面図、第3図は本発明の第1実施例の通心羽根車を具備する通心ポンプの側断面図、第4図は第3図の羽根車正面図、第5図、第6図、第7図はそれぞれ本発明の第2実施例、第3実施例、第4実施例の通心羽根車を具備する通心ポンプの側断面図である。1a—前面シュラウド、1b—羽根、1c—背面シュラウド、8、9—図8、10、11—図9、13、14、15、16—通過孔。

代理人 弁護士 藤田利雄

特開58-48796(2)

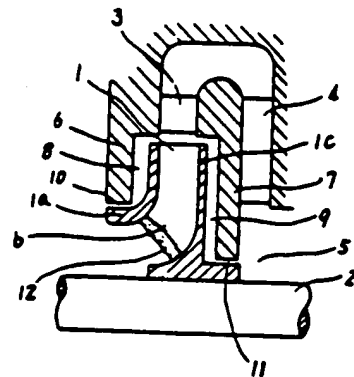
第5図は本発明の第2実施例を示し、前面シュラウド1a内に羽根1bに向かう通過孔14を設け、図8と羽根車入口部とを導通している。このように構成することによつて第1実施例により説明したものと同じ効果を得ることが出来るのはもちろん、通過孔14からの炭水が炭れを及ぼすことが少なくなる。

第6図は本発明の第3実施例を示し、背面シュラウド1c内に通過孔15を設け、図8と羽根車入口部とを導通している。また、第7図は本発明の第4実施例を示し、背面シュラウド1c内に通過孔16を設け、図8と羽根車入口部とを導通している。このように構成することによつて第1実施例により説明したものと同様に効果を得ることが出来る。

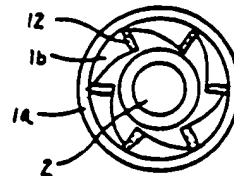
本発明によれば、ポンプの吸込圧が低くなくても、羽根車入口の静圧を上昇させることができるので、キャビテーションは発生せずキャビテーションによる腐食を防止できる。

4. 図面の簡単な説明

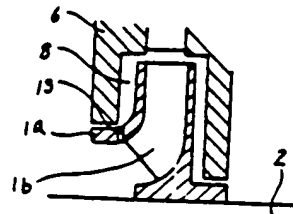
第 1 図



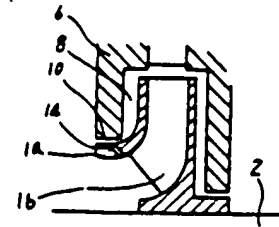
第 2 図



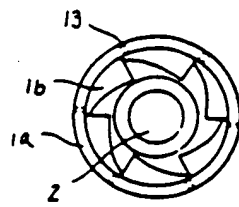
第 3 图



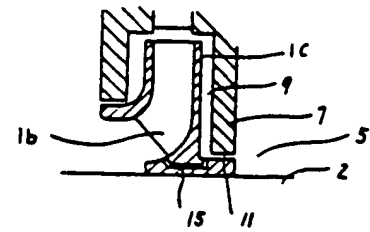
第 5 图



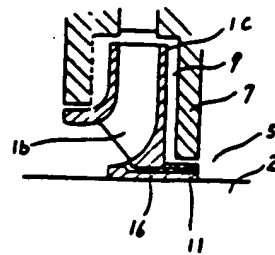
第 4 图



第 6 图



第 7 图



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